Minutes of spin meeting 08/27/08

Today's meeting continued to focus on the simulation of emittance growth due to horizontal tune jump. Fanglei tracked 500 particles with Gaussian distribution in all dimensions (including the momentum spread) through $G\gamma = 43.5$ to 44.5 with two tune jumps. The two quads are still put in I5/L5 as this is the condition for simulation in the past. Similar to the past, four cases are considered: one turn jump with and without quad error (lumped at I5 in the simulation with amplitude same as the tune quad strength); 50 turns jump with and without quad error. The results showed that there is no emittance growth problem for horizontal plane in the 50 turn cases, as the tune is far away from integer. The emittance changes for 50 turns are monotonous going up while the emittances still jump up and down for the one turn cases, which indicates that coherence motion is there after one turn jump. Thomas commented that only the emittances after the first one can be trusted in this case. It also indicated that one can scan how many turns for the jump to get emittance growth minimized. In general, the jump with error gives worse emittance growth and one turn jump is also worse than 50 turns. For 50 turns without error, the emittance growth (taking only the first jump) is less than 0.1% while it is more than ten times worse with the error. Yousef questioned if the error (100% of the actual jump) is too large for this estimation. Thomas estimated that the corresponding beta wave is about 20%. In reality, we don't know what the beta wave in the AGS is. Kevin comented that there may be a chance to get the beta wave from the ORM data taken in the past (with and without snake, injection and extraciotn lattices).

For the future simulation, we are going to use the 2.1T cold snake field map. To avoid generating additional beta wave by the two tune jump quads, their strength should probably be adjusted to generate same tune change when turned on individually. Practically, if we want to repeat this method in the AGS with beam, we need to measure the vertical tune down to 5% of the expected 0.007 tune shift by each quad, 0.00035. This probably is achievable with our current tunemeter at least at higher energy with long coherence (> 1000 turns).

Haixin